comment: we have descriptions of a large number of familiar wild animals, and in these the author has undoubtedly avoided as much as possible being at all scientifically exact. In our opinion the work would have gained in value and interest, and as an "educational" work, if the author had taken care, when he had to use scientific phrases, that he did so with some meaning. Thus it appears odd, to say the least, to read: "The bears, genus Ursidæ, belong in natural history to the sub-order Carnivora"; and that the kangaroos belong to the genus Macropodidæ. It would not have required a large knowledge of logic or science to avoid such mistakes.

Most of the photographs are from animals in the London Zoological Gardens, which will give a special interest to the volume.

OUR BOOK SHELF

First Year of Scientific Knowledge. By Paul Bert. (London: Relfe Brothers, 1886.)

THIS is an English edition of a little book which made M. Paul Bert's name familiar to a vast number of persons in France who knew nothing of his eminence either in science or in politics. As the title indicates, it is intended for children beginning to study science, and we know of no book better adapted for this purpose. It is a book of great merit both in style and selection of subjects. The more experimental sciences are treated as their nature demands—practically; the experiments are simple, and few will find any difficulty in performing them.

The illustrations constitute one of the special features of the book, for a diagram often conveys more meaning than a whole page of print. The language throughout is clear, and everything is simply yet accurately explained. As an example we may refer to p. 333, where the popular fallacy respecting the so-called "respiration of plants" is disposed of:—

. . . "Thus, simultaneously, in the same plant, two opposite phenomena take place: the production of carbonic acid by the parts that are not green, and consumption of carbonic acid by those that are green. Only, the latter activity being much more powerful than the former, the plant not only does not augment the proportion of carbonic acid in the air, but consumes what it finds there. . . . The decomposition of the carbonic acid by the green parts is quite the reverse of respiration, and bears a much closer resemblance to digestion."

The general character of the book leaves little to be desired.

La France en Indo-Chine. Par A. Bouinais et A. Paulus. (Paris: Challamel Ainé, 1886.)

THE important events of the last few years in Annam, Tonquin, and Cambodia have given rise to a quantity of literature in France, relating to this region, which has now reached enormous proportions. French periodicals of all kinds are full of papers relating to it, and new books on the same subject have been issued in many scores during the past three years. Every department of research is represented—historical, scientific, literary, antiquarian, industrial, commercial, &c. If this great flood represents, as it undoubtedly does, the keen interest taken by the French people in the countries with which they have now so close a connection, it is none the less embarrassing to foreign readers who desire to obtain a general and accurate survey of Indo-China. Amid the host of works, good, bad, and indifferent, now issuing from the French press on this region, and on every conceivable topic connected with it, it is difficult to select one which contains all that is wanted by the ordinary cultivated person, who desires to have some knowledge of countries which have been the theatre of events that have moved Europe profoundly. At last MM. Bouinais and Paulus have produced such a book. Capt. Bouinais has served long in Tonquin, and is actually a member of the Frontier Delimitation Commission, and Prof. Paulus, of L'Ecole Turgot, though, we believe, he has never visited the country, has made it a special study, and has laboured to popularise a knowledge of it in France. The two authors have already published a very much larger work on the same subject, of which the present one appears to be an abridgment intended for wider circulation and more general information.

Perhaps the most satisfactory manner of reviewing a work such as this, which covers a large and varied field with brevity, is to describe shortly its arrangement and contents. The first chapter refers to the geography, orography, hydrography, and climate of Indo-China, including in this term French Cochin China, Cambodia, Annam, and Tonquin. The second chapter deals with the history of French intercourse with these regions, commencing, properly speaking, with the cession to France of Tourane Bay and Pulo Condor in 1787, a cession which was due to the management of Pigneau de Béhaine, Bishop of Adran *in partibus.* All the interesting and exciting incidents of the occupation of Saigon, the Garnier and Philastre missions to Tonquin, and the events succeeding the death of Rivière down to the death of Courbet and the peace with China, are recounted with perfect clearness and accuracy. Next, the inhabitants are described, as well as the towns, and forms of religion prevailing in the countries. The aboriginal population is treated under the heads Moïs, Chams, and Muongs, a division which is perhaps sufficient in a book intended for popular reading, but which the authors themselves acknowledge to be wholly inadequate, as they refer also to "savages inhabiting the mountains," the phrase usually employed by the Chinese when speaking of a people about whom they know nothing. The ethnological questions connected with the Moïs, Muongs, Chams, and the unnamed "savages" can scarcely be answered for many years to come; but they are amongst the most interesting ones connected with ethnology in the Far East. The origin and relationship of these and other scattered fragments of once powerful peoples, not in Indo-China alone, but in Upper Burmah, and all over China south of the Yangtsze, did not come within the scope of MM. Bouinais and Paulus's work, although the latter shows how little is known about them when they are all classed indiscriminately as "savages of the mountains." The fourth chapter deals with productions, trade, and communications, and the fifth with the administration in each of the countries mentioned. Finally comes a chapter on the future, a political forecast, to which we need not refer further. The work, it will be seen, goes over the whole field, and, as far as we have been able to check the statements, it is very accurate. As there is no English book on the subject, this may be recommended to readers who desire to know something of the new region which is but now being brought into close contact with Europe. Whether the French are a colonising or only a conquering people, though much debated, is a question with which we are not concerned here: what is beyond all question is that no effort is spared by the Government or the public to acquire that first indispensable requisite of all good and intelligent government, viz. a knowledge of the country and people to be governed. No expense is considered too great, no labour too burdensome, to obtain this knowledge. In this respect they set an example which one more successful colonising nation at least might well follow.

My African Home. By Eliza Whigham Feilden. (London: Sampson Low, 1887.)

IN 1852 Mrs. Feilden and her husband went to Natal, where they remained for five years. On her return to

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England her letters were restored to her, and in the present volume she has arranged them in chronological order, with extracts from her journal. The book contains a mass of petty details in which few readers will find much to interest them; but there are also some very good sketches of the scenery of Natal and of the rough, free-and-easy life of the colonists. Mrs. Feilden was much impressed by the fertility of the soil, and by the beauty of the vegetation with which she was surrounded. "As for fruits, vegetables, and flowers," she wrote, "you have only to put the seeds and young plants in the ground and they grow. There is no end of season in Natal." She remarked that there were not many native fruits, but that all that were imported seemed to suit the soil and climate. The native flowers she considered "very exquisite." They "grew in great variety and luxuriance, with the waxy look of hot-house plants." As for birds and insects, the air teemed with them. Of the Caffres Mrs. Feilden formed a very poor opinion. "The Caffre is indolent; he lives only like the beast, to eat and sleep, and pass through life with ease; but to do this he must have his land tilled, and to purchase wives to till his land he must have cows to pay for them. He sells his daughters to be drudges to other Caffres, while the boys and young men go out to work for the white man, till they can in turn buy cows and wives." Even Caffres, however, have one good quality: "they heartily share anything they have with each other, and eat out of the same pot without the least feeling of who shall have most." To Mrs. Feilden they seemed to be rather like Jews, and she asks whether they may not be descendants of Ishmael or an offshoot from the lost tribes—from which it may be inferred that in the list of subjects she has tried to study ethnology has not yet been included.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

The Coal-Dust Theory

UNDER the title of "A New Mining Danger," the *Yorkshire Post* of the 16th ult. published its final report on the proceedings at the inquest on the bodies of twenty-two men and boys who perished in an explosion at Altofts Colliery, Normanton, on the 2nd of October last.

The inquest was commenced immediately after the explosion, but was adjourned until the workings could be sufficiently re-opened to admit of a careful examination being made into all the circumstances. It was resumed and concluded on the 13th, 14th, and 15th of December. The witnesses, including Mr. F. N. Wardell, Her Majesty's Inspector of Mines for the district, were unanimously of opinion that the explosion was originated by the firing of a shot in the stone or rock constituting the side of one of the main thoroughfares of the colliery, which was also a main intake airway; and they were of opinion that it had expended part of its energy in raising and igniting a cloud of coal-dust, which formed the nucleus whence the explosion was propagated.

The coroner in summing up agreed with this conclusion, and the jury returned the following verdict:—

"That the whole of the workmen killed, except Deakin and Lomax, met their deaths from an explosion of coal-dust, which originated in the west chain road, which explosion was caused by the firing of an unskilfully drilled shot by one of the men engaged in widening the road; and that Deakin and Lomax were suffocated by the stoppage of ventilation consequent on the explosion."

The coal-dust theory, which is discussed at some length in the Final Report of the Royal Commissioners on Accidents in Mines, postulates that coal-dust may not only serve to originate an explosion, under certain given conditions, but may continue to carry it on as far as the same conditions extend. The essential conditions appear to be: that the coal-dust be perfectly dry, in a very fine state of division, and fairly abundant in quantity; that the initial cause be a large flame expanding with sufficient force to propel the air rapidly in front of it, so as to raise a cloud of coal-dust; and, lastly, that the explosion take place in a confined space, such as the workings of a mine.

From the first this theory was intended to account for great explosions in mines, or accomplished facts, which seemed to be otherwise inexplicable. It has nothing to do with mines in which explosions have not taken place, except to point out a possible source of danger; and arguments opposed to it which are based upon the fact that all kinds of coal-dust are not equally inflammable are therefore obviously inapplicable. It was adopted by the Prussian Commissioners as being applicable to certain inflammable dusts in a minute state of subdivision, but not to others of a somewhat different chemical composition. In discussing the Camphausen explosion in NATURE (vol. xxxi. p. 13), I pointed out that the conclusions arrived at from a consideration of the experimental results obtained with Camphausen dust by the Prussian Commissioners, fell far short of the actual occurrence in the colliery, and that the same relation would probably obtain in the case of all the other dusts experimented with, provided all were made equally fine.

MM. Mallard and Le Chatelier, whose conclusions were accepted by the French Commission, of which they were members, rejected the coal-dust theory, and endeavoured to reason away all apparently confirmatory arguments drawn from the consideration of actual explosions in mines.

In this country it has been accepted by some of the Inspectors of Mines, and more particularly by Messrs. W. N. and J. B. Atkinson, who uphold it vigorously in their treatise on "Explosions in Mines," which was recently reviewed in NATURE (Nov. 4, 1886, p. 1) by Prof. Thorpe. It appears also to have found favour with a number of mining-engineers and colliery managers, both here and abroad. There seems, however, to be some doubt as to how far it was accepted by the Royal Commissioners on Accidents in Mines, and I shall therefore quote their own words on the subject:—

"In emphasising this claim (Proc. Roy. Soc., vol. xxxvii. p. 43), Mr. Galloway does not appear to have realised the fact that, *if dust were the principal agent* in coal-mine explosions, *every* blown-out shot occurring in a *very* dusty and dry mine should actually be attended by a more or less disastrous explosion or conflagration, and that, looking therefore to the enormous amount of powder expended in shot-firing in this and other countries, and to the not inconsiderable proportion which blown-out shots must constitute, in many localities, of the total number of shots fired, disastrous coal-mine explosions should be of more than daily occurrence, if his view were correct."

I submit that the conclusion here stated is not deducible from the premiss; and in support of this position I adduce the fact that coal-dust is *admitted* to have been *the principal agent* in two of the most disastrous explosions of the present year, namely, those of Mardy and Altofts collieries, in both of which shots were fired. Altofts Colliery alone is sufficient to prove the case against the Commissioners, for it has been in operation for twenty-one years, and shot-firing has been carried on in it during the whole of that period. If, then, blown-out shots constitute a "not inconsiderable proportion" of the whole, there is a probability amounting to a certainty that such shots must have been fired in Altofts Colliery many times without the results here postulated having been attained until now. The argument as made use of against my own views appears therefore not to be in accordance with ascertained facts.

It may be safely maintained, therefore, that every blown-out shot does not fulfil the whole of the conditions necessary for creating an explosion. For instance, the dust may not be present in sufficient abundance within reach of the flame; it may not be fine enough to ignite at the point where the shot explodes; it may contain too much foreign matter, or be covered with coarse rubbish, or be locally damp; the shot may be too high, or too low, or pointed in an unfavourable direction; the direction and velocity of the passing air-current may exercise some influence on the result; the creation of a nucleus of explosion may in certain cases be facilitated by the previous formation of a cloud of coal-dust to windward, raised by another

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